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Developing a framework for open innovation

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DEVELOPING A FRAMEWORK FOR OPEN INNOVATION

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Abstract

High tech companies face continual pressures to innovate, differentiate, and be first to market. Open innovation allows organizations to focus on their core competencies while developing strategic alliances that create win-win relationships and competitive advantages for all parties involved. However, open innovation introduces certain risks and challenges and a consistent framework for open innovation is lacking. This study developed a high-level framework for planning and executing open innovation within the high tech industry. A convenience sample of nine managers experienced in the high tech industry experience and open innovation were interviewed about their perspectives, experiences, and approaches related to open innovation. Results confirmed the lack of open innovation roadmaps or playbooks in use, due to the inherent uncertainty and complexity of open innovation. Diligent vetting of partnerships is critical for success in open innovation, as incompatible partner characteristics can undermine the success of such initiatives.

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Chapter 1

Introduction

Companies are constantly on the hunt for new opportunities as they strive to create a competitive advantage, deliver value, and win market share (Galvango & Dalli, 2014). Sometimes during this process, they envision products they are not entirely capable of producing (Gassman, Enkel, & Chesbrough, 2010). To continue forward with the product, they have to discover a way to solve the knowledge, skill, capability, intellectual property, and network gaps that exist to deliver on their vision. Approaches to fill the gaps such as mergers and acquisitions, outsourcing, hiring, and learning tend to be long-term, expensive strategies that risk missing the window for competitive opportunity or failing to deliver the intended products altogether (Chesbrough & Bogers, 2017).

Especially within the high tech industry, the pressures to innovative, differentiate, and be first to market are intense. Turnover is frequent and technological advancement also are rapid (Thomson Reuters, 2018). Chesbrough proposed open innovation as a new approach for organizations to increase innovativeness (Füller, Matzler, & Hoppe, 2008), lower costs for R&D (Prandelli, Verona, & Raccagni, 2006; Sawhney, Verona, & Prandelli, 2005; von Stamm, 2004), reach outside of organizational boundaries (Pontiskoski & Asakawa, 2009), and offer ways to share knowledge and extend the value of the products they create (Chesbrough & Bogers, 2017).

Open innovation additionally allows organizations to focus on their core competencies and develop strategic alliances so they can create win-win relationships, create value, and (when implemented correctly) deliver products and services better, stronger, and faster (Ponstiskoski & Asakawa, 2009). A prime example of this is one of Apple's most notorious product inventions: the iPod. Utilizing the open innovation

framework, Apple was able to focus on its own dynamic capability (imagination), while developing strategic alliances with Wolfson, Toshiba, and Texas Instruments to deliver the product they had designed (Gassman et al., 2010).

At the same time, open innovation introduces certain challenges given the amount of effort it takes to determine the correct partnerships, protect intellectual property, sustain strategic relationships, build research capabilities and absorptive capacity, and maintain the cross-functional drive needed to work outside of an organization's boundaries (West & Gallagher, 2006). Alignment between organizations and employee motivation are two additional major hurdles when organizations are dependent on other firms to develop a product (West, 2006). It would be helpful to create a consistent framework for planning and executing open innovation (Chesbrough & Bogers, 2017; West, 2006), given the wide range of benefits and opportunities organizations can gain with this approach to product development and creation (West & Gallagher, 2006).

Study Purpose

The purpose of this study was to develop a high-level framework for planning and executing open innovation within the high tech industry. Three research questions were examined:

1. What are the steps in the open innovation process?
2. What challenges threaten the success of open innovation projects?
3. What best practices may be applied to the process to promote successful outcomes?

Significance of the Study

A clear roadmap to implementing open innovation is lacking. This research aimed to help close this knowledge gap for high tech organizations looking to implement the

open innovation model, potentially creating a clearer roadmap for how open innovation is conducted and how it can benefit their organization. By conducting thorough research regarding each step of the open innovation process, it may provide the opportunity for firms to realize where they are in the open innovation process and how they can best take the next steps to help recognize their product as a reality.

With this research, there was the possibility to create new opportunities for consultants, firms, and individuals by providing a new resource to help guide them through the open innovation process. In doing so, there was a potential for high tech organizations to deliver world changing products that are of higher quality, cost less to make, and take less time to develop.

Definitions

Four definitions are relevant to this study:

1. Open innovation: a distributed innovation process based on deliberately managed knowledge flows across organizational boundaries, using financial and non-financial mechanisms aligned with the organization's business model (Chesbrough & Bogers, 2017).

2. Co-creation: an interactive, creative social process between stakeholders that is initiated by a firm at different stages of the value creation process (Roser, DeFillippi, & Samson, 2013).

3. High tech organizations: any firm with 14.5% or more of employees in science, technology, engineering, or mathematics.

4. Science, Technology, Engineering, and Mathematics (STEM): industries and careers associated with high tech organizations.

Organization of the Study

This chapter discussed the reason for the study, the purpose of the study, its research questions, research setting, and the study's significance.

Chapter 2 reviews the essential bodies of literature that support this study, including co-creation. It also includes a literary review of open innovation that addresses

what it is, why it exists, and how it is conducted and measured. Risks, challenges, and settings for open innovation also are discussed and the link between co-creation and open innovation is considered. Finally, literature on the high tech industry is examined to outline what it is, who the key players are, and what the role of the industry is in the global economy.

Chapter 3 provides a description of the methods used in the study, including how it was designed, who participated and what the ethical considerations were governing their participation, how the data was collected, and what procedures were used to analyze the data.

Chapter 4 presents the results that emerged from the study. After presenting participant profiles, the results are organized by research question.

Chapter 5 discusses and summarizes key findings by research question; draws conclusions; presents recommendations for organizations in the high tech industry, consultants, and students; acknowledges the study limitations; and outlines directions for future research. The chapter closes with an overall summary.

Chapter 2

Literature Review

The purpose of this study was to define a high-level framework for planning and executing open innovation within the high tech industry. This chapter provides a review of relevant literature. Two concepts are important to open innovation: co-creation and studies and theory on open innovation itself. Co-creation is an interactive, creative social process between stakeholders that is initiated by a firm at different stages of the value creation process (Roser et al., 2013). In this study, co-creation is understood as the interactive social process occurring among internal and external stakeholders (and often including customers [Anbardan & Raeyat, 2014]) for the purpose of open innovation. The first major section in this chapter provides an overview of co-creation, including why it is important, processes and metrics, risks and challenges, settings for co-creation, and examples that outline how it has worked in the past.

The next major section in this chapter provides a comprehensive review of open innovation. Open innovation is "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in like with the organization's business model" (Chesbrough & Bogers, 2017, p. 7). This chapter examines why open innovation is needed, what processes and metrics govern its use, what settings are suitable for open innovation, and how co-creation processes occur within and enable open innovation.

The third major section in this chapter covers the high tech industry, the setting for this study. In this final topical section, definition of the high tech industry is provided and explanation is offered regarding why it is important to the global economy. The chapter closes with a summary.

Co-creation

Co-creation, at its highest level, is defined as "an interactive, creative social process between stakeholders that is initiated by a firm at different stages of the value creation process" (Roser et al., 2013, p. 22). It is advocated as a means to expand the innovation and value creation of a firm while nurturing customer relationships and lowering cost for marketing R&D (Prandelli, Verona, & Raccagni, 2006; Sawhney et al., 2005; von Stamm, 2004). From a co-creation perspective, suppliers and customers are no longer on opposite sides, but instead interact with each other to create new business opportunities (Galvango & Dalli, 2014).

There are two evolving bodies of literature in the co-creation context: business to consumer (B2C) co-creation (Prahalad & Ramswamy, 2004)and business to business (B2B) co-creation (Roser et al., 2013). B2C co-creation refers to a process where marketers realize that it is both an advantage and a competitive necessity to systematically include consumers in the development and marketing process (Sawe & Thelander, 2015). Using this framework, customers' knowledge and creativity are deemed invaluable; as a result, interaction between consumers and businesses is considered crucial (Normann, 2001). B2B co-creation literature focuses on co-innovation, which often is used as a catalyst to form strategic alliances with stakeholders characterized by collaboration and trust between two or more autonomous firms working together—either in a contractual or equity based relationship (Doz & Hamel, 1998).

Regardless of co-creation context, it is always a collaborative innovation process among stakeholders. Moreover, all forms of co-creation efforts involve processes expanding organizational boundaries, involving co-creators, and co-creating new value based on co-creator involvement initiated by the firm (Roser et al., 2013).

Importance of co-creation. Co-creation is a new and exciting research discipline and managerial paradigm (Piller, Ihl, & Vossen, 2010). Perhaps most exciting, is how it creates multidimensional value. By involving co-creators, firms are intentionally extending their value chain (Helm & Jones, 2010), leading to an expansion of organizational boundaries and opening the door to unprecedented relationships and opportunities unique to a firm's value creation process (Sawhney & Prandelli, 2000).

Since the turn of the century, the marketing literature has seen a shift from transaction focused relations to collaboration focused relations, where stakeholders increasingly share their own competencies through dialogue (Prahalad & Ramaswamy, 2000; Sawhney, 2002; Sheth & Uslay, 2007). At the time of conducting this research, current marketing theory suggests that goods are no longer just end products, but can also be considered intermediate products that are utilized by consumers in a value creation process (Roser et al., 2013). This suggests that people are no longer seen as simply buying a good or a service; instead, they are instead utilizing products that provide service and value that depend on the customer's experience, referred to as *value in use* (Macdonald, Wilson, Martinez, & Toossi, 2011). Co-creation mirrors this paradigm shift, where "brand value is not only co-created through isolated, dyadic relationships between firms and customers […] it is also co-created though network relationships and social interactions among the ecosystem of all the stakeholders" (Merz, He, & Vargo, 2009, p. 338).

Additionally, co-creation provides the opportunity for stakeholders to engage in the production of new products, which has led to measurable values of increased innovativeness (Füller et al., 2008), higher brand attachment from consumers (Mugge, Schoormans, & Schifferstein, 2009), increased willingness to pay from consumers

(Franke & Schreier, 2010), reduced risk to firms (Maklan, Knox, & Ryals, 2008), more favorable product evaluations (Norton, Mochon, & Ariely 2011), better product quality (Füller et al., 2008), faster speed to market (Alam, 2002), and lowered costs for R&D (Prandelli et al., 2006; Sawhney et al., 2005; von Stamm, 2004). With these benefits in mind, companies with an ever-wider range of product categories use co-creation as a vehicle to gain competitive advantage (Schnurr, 2017).

From a B2B perspective, co-creation is seen as a means to enable "cross-fertilization and stimulation of ideas through shared knowledge and experience" (Swink, 2006, p. 38). The theory being that co-creation creates a multi-stakeholder perspective as a means to facilitate a more holistic and diverse approach to developing value creation for a business's outlining objectives (Clarke & Nilsson, 2008; Payne, Storbacka, Frow, & Knox, 2009).

From a consumer studies perspective, the consumption of a product is a highly symbolic and cultural activity, where consumers give subjective meanings to the goods they purchase (Belk, Wallendorf, & Sherry, 1989; Holbrook & O'Shaughnessy, 1988). Recent studies have provided evidence that the value of co-created products outpaces that of mass-produced produced purchased off the rack (Franke & Piller 2004; Franke & Schreier, 2010; Norton et al., 2011; Schreier, 2006). The value is that when consumers are actively involved in the creation of new products, the end result is likely to meet consumers' personal requirements. Moreover, consumers are likely to have feelings of accomplishment while assessing their role in the co-creation process (Schnurr, 2017), creating greater feelings of brand attachment (Mugge et al., 2009).

Businesses need to innovate to adapt themselves to an increasingly complex marketplace. As businesses and consumers become more connected, value creation

occurring across networks rather than from a single firm's value proposition becomes more imperative (Roser et al., 2013). Moreover, the complexity and dynamism of today's marketplace mean that it is increasingly difficult for firm's to compete alone, as they must have a strong value proposition and unique expertise to stay competitive. This may be best achieved through a balance of alliances that complement their knowledge and improve their competitive position (Pérez & Cambra-Fierro, 2015).

Process and metrics for co-creation. Both B2C and B2B forms of co-creation extend the value chain (Helm & Jones, 2010). Therefore, organizations need to develop an effective strategy for choosing who will be involved in the co-creation process and how they will carry it out (Roser et al., 2013).

Information and Communication Technologies (ICTs) have brought exciting new possibilities to the world of co-creation, utilizing online communities and web-based engagement platforms to facilitate the process. These ICTs have allowed organizations to utilize a new form co-creation called crowdsourcing, also known as "a process of outsourcing activities […] to an online community or [generally large] crowd" (Whitla, 2009, p. 15). Crowdsourcing can be effective for both B2B and B2C contexts, as this software-enabled tool is designed to solicit information from large audiences (Roser et al., 2013).

Depending on the nature of the co-creation, firms may seek to design different types of co-creator relationships or choose to utilize a mixed methods approach (Roser et al., 2013). Roser et al. advise firms to consider seven inputs when designing a methodology for co-creation: (a) type of co-creator (who will be involved), (b) purpose or reason for co-creation, (c) locus point in the innovation process where co-creation needs to occur, (d) intimacy (how much involvement from co-creators is expected), (e) amount

of time expected from each stakeholder, and (f) incentives for how the co-creators are to be motivated.

Another key factor that must be managed in the co-creation process is governance—who will be in charge? Three key types of governance are discussed in the co-creation literature: (a) market governance, often motivated by prizes or market equity; (b) hierarchical governance, determined by a set of rules put in place by a governing authority; and (c) relational governance, trust-based interactions such that each party feels intrinsically motivated to participate in the co-creation venture (Heide, 1994).

For B2B ventures, the most common design for co-creation processes utilizes a hierarchical structure, typically involving a steering committee with representatives from both organizations. B2C ventures are more likely to utilize market based governance, offering both intrinsic and extrinsic motivators for customers to engage in the co-creation process (Füller, 2010).

Since there are many ways an organization can develop a co-creation strategy, the methods for evaluating such are vast. When Proctor and Gamble and Xerox participated in a co-creation venture aimed at reducing print costs, both organizations agreed on a scorecard for monitoring project collaboration and success. The scorecard involved the achievement of cost goals, sustainability goals, and mobility goals (Roser et al., 2013). Volvo's XC90 imitative, a co-creation project designed to collaborate with customers to develop a personalized car, was primarily focused on the projects cost-effectiveness. Hence, each co-creation must take on a different style of governance, including checks and balances, to meet different managerial implications to effectively design an end-to-end co-creation strategy.

Risks and challenges of co-creation. From a B2C perspective, the co-creation paradigm has received several critiques. From a consumer perspective, it has been noted that companies may be exploiting consumer labor (i.e., creativity, time, work) while simultaneously running a risk of the consumer behaving in ways other than what is prescribed by the company (Cova & Cova, 2012; Zwick, Bonsu, & Darmody, 2008). It has also been noted that consumers may lack an inherent want or need to necessarily interact with organizations in a co-creation context (Schau, Muñiz, & Arnould, 2009; Pongsakornrunglsip & Schroeder, 2011). Additionally, when a firm is working to manage its brand identity, uncertainties may arise due to the need for greater coordination between multiple stakeholders with competing interests (Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010).

From a B2B perspective, the willingness of each stakeholder to collaborate and learn plays a significant role that needs to be evaluated when creating value between firms, which involves an inherent amount of risk when assessing the desired outcome of a co-creation project (Pérez & Cambra-Fierro, 2015). More factors of risk include the consistency of the relationship, trust between stakeholders, and commitment to the initiative (Morgan & Hunt, 1994). Power imbalance is also noted to be an area of focus when assessing the risk of a co-creation venture, noting that most co-creation processes have a certain level of power imbalance and the powerful party may seek or expect a disproportionate share of the surplus value (Hingley, 2005).

Moreover, the complications between small, medium, and large-scale companies can be a challenge to navigate. It has been found that small enterprises often have trouble connecting with key stakeholders at larger enterprises involved in the co-creation process, and find it dually challenging to overcome the often bureaucratic culture of large firms,

which can lead to asymmetric relationships between firms (Prashantham & Birkinshaw, 2008).

From an employee standpoint, when a firm introduces a co-creation strategy, states of heightened uncertainty with regards to risks and benefits, including potential loss of control, play a key role in assessing the risks a co-creation venture (Whalen & Akaka, 2016). These uncertainties can often deter employees from engaging in the co-creation process, and if firms fail to communicate the value of the initiative, they run the risk of failing to realize the full value of the co-creation relationship (Figueiredo & Scarabato, 2016).

Settings for co-creation. To develop a comprehensive understanding regarding the parallels between B2B and B2C co-creation, it is important to take note of the current literature regarding the ongoing co-creation debate. However, for the purposes of this research, the literature utilized examples from B2B environments to support the context of the study. As noted, co-creation can be applied any time companies need a vehicle for increasing value and enhancing competitive advantage (Schnurr, 2017).

Several well-documented examples of B2B co-creation strategies exist within the automotive (Dahlsten, 2004), travel (Chen, Yang, & Leo, 2017), technology (Piller, Vossen, & Ihl, 2012), and product development (Roser et al., 2103) industries, as well as within the arts (Säwe & Thelander, 2015), innovation, and among R&D teams hired to develop products and services across a wide range of business contexts (Roser et al., 2013). It should be noted that no literature was found regarding where and when co-creation may not be suitable.

Value creation is the key area of focus in B2B co-creation. Thus, firms that need to provide additional value between firms, suppliers, distributors, and suppliers may find

themselves in environments that are conducive to co-creation. Moreover, co-creation has well-documented evidence of success among organizations that have equally abundant strategic resources and similar organizational contexts (e.g., culture, organizational processes, strategic goals; Pérez & Cambra-Fierro, 2015). It should be noted that less successful co-creation outcomes have been reported by companies lacking (a) technologization, defined as the online tools and devices that aid in co-creation tasks, or (b) connectivity, defined as the availability to seek support from co-creators (Verleye, 2015).

Examples of co-creation. In this section, two examples of co-creation are reviewed: Xerox/Proctor & Gamble (P&G) and Innocentive Inc. In 2009, P&G and Xerox embarked on a co-creation venture to innovate ways to streamline print solutions and services. The context of this venture was that Xerox was to receive a $140 million, 5-year service contract to manage all aspects of P&G's print services. What made this co-creation notable was that this partnership required each company to share their technology to develop new capabilities that each firm would not have been able to develop on their own. This partnership yielded results that freed up hundreds of minutes of time annually for P&G's 170,000 employees, while Xerox technologists provided technical support and onsite training to manage their new printing structure (DeFillippi, Dumas, & Bhatia, 2011). The result for Xerox was that it met its goals of strengthening its co-innovation portfolio while fostering a financially beneficial strategic partnership with P&G (Roser et al., 2013).

To promote success of the co-creation venture between P&G and Xerox, a style of governance was needed that fit the project's goals. As both companies were large, hierarchical organizations, a hierarchical co-creation governance also was instituted. To

accomplish this, a steering committee comprised of leaders and customer-facing employees from both organizations was created to develop a holistic approach to their co-creation strategy (Roser et al., 2013).

Innocentive, Inc., is a self-proclaimed "open innovation" company that relies on principles of crowd-sourcing and prize competition to solve complex R&D problems. Innocentive has a wide range of customers, most of which are facing a scientific, technical, business, or organizational challenge that has not yet yielded a solution using the organization's existing network. When a customer engages Innocentive, they utilize their platform that not only manages a complex network of co-creators who specialize in a variety of fields, but also works to manage all legal issues regarding the management of intellectual property during the co-creation process (Roser et al., 2013).

Innocentive helps a wide range of clients that are both customers seeking problem solutions, as well as expert individuals and organizations who are leaders in their fields seeking to co-create solutions to highly complex problems. Although the co-creation governance design involves a hierarchy, the design is predominantly market-based, using market supply and demand to drive innovation within Innocentive's platform. As a result, multiple companies and problem solvers collaborative and act as resources for each other, all in a digital space (Roser et al., 2013).

Open Innovation

When Dr. Henry Chesbrough (2003) popularized the term *open innovation*, his guiding theory was that organizations would be more effective if they utilized outside knowledge to facilitate innovation while letting unused technologies and ideas be utilized by firms outside of their organization. By design, open innovation encourages organizations to reach outside their current boundaries and derive meaning from the

intellectual property and value created by a larger network. What is unique about the concept of open innovation is that it challenges traditional R&D models that use a closed innovation strategy that keeps product development in-house (Chesbrough, Vanhaverbeke, & West, 2017). Three subsets characterize how open innovation is conducted (Chesbrough & Bogers, 2017):

- Outside-in innovation: the firm opens up its own innovation processes to many kinds of external inputs and contribution.
- Inside-out innovation: the organization allows unused and underutilized ideas and assets to go outside the organization for others to use in their business model.
- Coupled open innovation: the firm uses both outside-in and inside out innovation to co-create and commercialize an innovation (Gassman & Enkel, 2004).

As a means of context for the following research, open innovation, unless specified otherwise, is in relationship to the creation of a product. In this study, open innovation refers to activities related to creating a new product, in contrast to designs for open innovation that focus on social innovation and services innovation (Chesbrough et al., 2017).

The need for open innovation. The vast majority of management literature and business practices have pursued a closed model for knowledge creation and innovation. This means that they keep knowledge and intellectual property within their organizational boundaries as a key driver for sustainable business performance rather than pursuing or sharing these with others outside the firm. This approach has been described as a black box approach and purportedly leads to the "not invented here" syndrome, where firms regard knowledge created outside of their organizational boundaries inferior (Chesbrough & Bogers, 2017).

Open innovation is a challenge to this style of thinking; it has shown itself to work in parallel with the way businesses operate as they increasingly become more globalized and their customers' product needs become more complex. The process of open innovation opens up the black box, demonstrating how shared knowledge can create extended value and the whole can become greater than the sum of its parts (Chesbrough & Bogers, 2017).

Moreover, open innovation plays a key role in adding value to a firm's R&D efforts. Because firms rarely are able to predict the outcomes of the R&D process, some knowledge and technology products from R&D fall outside the scope of the sponsoring firm's purposive investment and thus are underutilized. Nelson (1959) noted that firms financing the R&D process had only limited ability to create value from these so-called spillovers. According to an open innovation paradigm, these spillovers can be transformed into additional value when deliberately managed from an inside-out, outside-in, or coupled open innovation model (Chesbrough & Bogers, 2017).

From a research standpoint, open innovation has grown rapidly since the term was first coined by Chesbrough (2003). At that time, a Google search for the term yielded around 200 page-inks that were only loosely linked to the concept. In 2012, the same Google search yielded 483 million links, and the scope and breadth of open innovation research has only increased since (Chesbrough & Bogers, 2017).

In an increasingly globalized economy, more and more businesses are realizing they need to find new ways to do things. To do that, be it product, technology, service, or a combination of the three, companies have an ever-increasing need to integrate the full breadth of available ideas, research projects, and concepts into their own offering. Moreover, companies have demonstrated enhanced value creation by focusing on what

they are good at and outsourcing what they cannot or need not do themselves. All of this acts within the open innovation framework, thus, designing for a competitive advantage (Pontiskoski & Asakawa, 2009).

Process of conducting and measuring the effectiveness of open innovation. To gain a better understanding of how companies successfully manage the open innovation process, it is useful to look at case studies from Apple, Nintendo, and Nokia (Ponstiskoski & Asakawa, 2009):

Apple is renowned for using out of the box strategies to design its products—perhaps most notably, the lack of market research they conduct to identify the needs of the market. One of Apple's core principles is that if they create something they are passionate about, consumers will purchase their products, regardless of what current market trends suggest. Thus, Apple's dynamic capability would be that their development teams are able to create products of the future without spending too much time looking into the past (Ponstiskoski & Asakawa, 2009).

Perhaps Apple's most competitive product release to date, the iPod, is a superior example of this dynamic capability. However, they did not complete the iPod alone (Ponstiskoski & Asakawa, 2009). The technical design was managed by Portal Player, an alliance with Wolfson, Toshiba, and Texas Instruments that earned $15 per iPhone sold. Thus, Apple was able to focus on their core competencies while utilizing the technological know-how and skills of value created outside of their organization (Gassman et al., 2010).

When Nintendo released the Wii, its highly successful gaming console, its goal was to create an unprecedented gaming experience. During the time of its release, Sony's Playstation and Xbox's 360 console were pitted in heated competition to develop best-in-

class graphics experiences. Nintendo decided to go against this industry standard and focus on the gaming experience. Nintendo introduced a new and communal aspect to gaming, including more female avatars, thus providing the ability for the whole family to enjoy the gaming experience. Customer input, which emphasized the desire for a more inclusive gaming experience, informed this decision that later became a competitive advantage. In other words, customers' invaluable knowledge comprised a knowledge inflow that provided the open innovation context (Ponstiskoski & Asakawa, 2009).

The story of Nokia presents a highly useful example of the need for open innovation, as the company did not possess the capability in-house to develop its first line of N-series phones did not exist within the organization. The need for external R&D provides for a meaningful context regarding how organizations must move away from the "not invented here" syndrome, since their partners across the world maintained contracts with external organizations. Bearing this in mind, Nokia had to utilize their dynamic capability (process leadership) to simultaneously manage external partners across the globe, while maintaining a competitive advantage over companies utilizing the same technologies (Ponstiskoski & Asakawa, 2009).

In summation, the way in which open innovation is designed and implemented is highly contextual. Each firm described in this section used deliberate knowledge inflows and outflows to create competitive advantages in mature industries. This is the essence of open innovation (Ponstiskoski & Asakawa, 2009).

Risks and challenges of open innovation. Open innovation comes with its share of organizational and strategic challenges. West and Gallagher (2006) point out that organizations may face challenges related to maximizing returns, cross-functional motivation, and availability of external sources during open innovation initiatives. First,

firms generally need to utilize a wide range of approaches to maximize the returns of outsourcing internal innovation. Second, external knowledge adds no value to organizations if they lack the capacity to identify or incorporate these inputs into their innovation process. Namely, organizations need research skills, absorptive capacity, and motivation across functions to incorporate said knowledge. Third, open innovation literature suggests and has confirmed that outside-in sources of innovation will arise. However, the availability of these streams of external innovation remain available a concern.

It is helpful to consider the story of Symbian, leading maker of the smartphone platform 2003–2010, to provide further context regarding the organizational risks and challenges of open innovation. In 2007, Symbian's software accounted for 63% of all smartphones sold. By 2011, the company was dismantled when its partners adopted the Windows (rather than Symbian) platform (West, 2006).

Symbian's open innovation model involved two outside organizations for purposive inflows of innovation: (a) network operators that ran the network to which Symbian was connected and (b) the interface supplier. Symbian faced major difficulties as the smartphone system evolved because the company had limited control over the application programming interfaces and the user experience (West & Wood, 2013).

The next wave of smartphone design, added layers of complexity made the implementation of Symbian's platform a pervasive challenge. In this new reality, Symbian's platform had to control voice, messaging, and data access to its telephone networks. Moreover, these functionalities needed to be delivered in a pocket-sized device that had to include highly specific weight, power, and battery constraints. Symbian lacked the direct relationships with customers enjoyed by competitors Apple and

Microsoft; therefore, Symbian had to rely on third party vendors to get their software into the hands of the increasingly competitive open market. Apple and Microsoft took advantage of Symbian's competitive disadvantage and cemented a connection with customers that Symbian could not compete with, and the company soon became obsolete (West & Wood, 2013).

Settings for open innovation. Extensive academic research has been conducted on implementations of open innovation—primarily within 33 industries. The most researched and documented implementations of open innovation have been reported in the field of management (603 articles), business (338 articles), industrial engineering (173 articles), operations research and management science (129 articles), and planning and development (123 articles), totaling 1965 articles researching the implementation of open innovation across industries **(**Gassman et al., 2010**)**.

According to West, Vanhaverbeke, and Chesbrough (2006) there are five levels of analysis in which the open innovation context can be researched, implemented, and examined: individuals and groups, firm/organizations, inter-organizational value networks, industry and sector, and national institutions and innovation systems. As Chesbrough et al. (2017) note, the firm/organizational and network level open innovation implications have received the most attention, while the individual and groups, industry and sector, and national institutions and innovation systems are not receiving the same amount of attention.

Notable, well researched organizations that have implemented the open innovation platform include Amazon, Facebook, Salesforce.com, Apple, P&G, Microsoft, Nasa, Lego, GE, and Samsung. Each of which have contributed meaningful

case studies and thought leadership to the open innovation narrative (Vanhaverbeke & Chesbrough, 2017).

Co-creation processes for open product innovation. While co-creation is defined as "an interactive, creative social process between stakeholders that is initiated by a firm at different stages of the value creation process" (Roser et al., 2013, p. 22), open innovation is defined as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in like with the organization's business model" (Chesbrough & Bogers 2017, p. 11).

At the time of the present research, literature explicitly linking co-creation and open innovation was sparse. Anbardan and Raeyat's (2014) paper entitled "Open Innovation: Creating Value Through Co-Creation" provides meaningful insights regarding the linkage between co-creation and open innovation despite its focus on B2C environments. Their article examined how open innovation helps companies in creating value through co-creation activities using a qualitative research approach to gain a better understanding. During the course of their research, Anbardan and Raeyat detail that co-creation is a strategy to realize open innovation. Additionally, the research points to Prahalad and Ramaswamy (2004), who elicits their four pillars for effective co-creation: dialogue, access, transparency, and risk.

In summation, while open innovation suggests active collaboration between different organizations utilizing the sharing of intellectual property (Vanhaverbeke & West, 2017), co-creation relates more specifically to creating value by leveraging the collective contributions of an organization and a group of stakeholders—often including

customers. Anbardan and Raeyat (2014) noted that studies examining the role of co-creation in open innovation are lacking.

High Tech Industry

Wolf and Terrell (2016) define a high tech company as any firm that has 2.5 times the national average of STEM workers within it. Any occupation related to STEM is considered a professional role within high tech. STEM occupations include such roles as IT workers, scientists, postsecondary teachers, and managers of these workers (Wolf & Terrell, 2016). STEM occupations account for roughly 5.8% percent of all jobs in the United States (Thomson Reuters, 2018).

The high tech industry is divided into three subsets of, ranked in order of employment distribution in the United States (Wolf & Terrell, 2016):

1. High tech services industries: management of companies and enterprises, management, scientific and technical consulting services, and computer systems design and related services.
2. High tech manufacturing: electrical equipment manufacturing; navigational, measuring, electro medical and control instruments; and semi-conductor or other electrical components.
3. "Other" high tech industries: these include oil and gas, the management of electric power, state government education, and federal government.

Among the top 100 high tech companies in the world, as identified by financial performance, management and investor performance, innovation, and environmental impact, the United States is home to 45% of these firms. These organizations include Alphabet, Amazon, Facebook, Microsoft, Hewlett Packard Enterprise, Nvidia, and Symantec (Thomson Reuters, 2018).

Asia also has a notable share of the world's high performing tech companies, being home to 38% of the world's high tech firms, including Tencent, Samsung, and

Taiwan Semiconductor Manufacturing, the last of which has reported a 61% increase of quarterly revenue over the past year, respectively (Thomson Reuters, 2018).

Among the world's top 100 high tech firms, there has been a 13.09% year over year investment in R&D, while the S&P 500 Information Tech index saw a gain of 12.34% gain as well. According to Thomson Reuters (2018), the amount a firm spends on R&D investment is a strong indicator of its financial status and focus towards growth. Moreover, R&D investments have proven to be a strong indicator of a firm's corporate sustainability efforts, keeping an eye on health and longevity.

In the United States, between the years of 2014 and 2024, the high tech sector is expected to gain 691,000 jobs, resulting in an 11.7% share of total employment by 2024. Moreover, the output of these jobs is expected to grow by $2.4 trillion, developing a 22.9% share of the country's economy (Wolf & Terrell, 2016).

Globally, there were four deals in 2017 that totaled in over $10 billion each in value, including mergers, acquisitions, and buy-outs for companies such as Broadcam, KK Pangea, Intel, and Vantiv, Broadcam (which accounts for the world's largest ever deal in the high tech industry), totaling a $115.4 billion bid for the chipmaker Qualcomm. Additionally, over the past year, there have been significant advancements in quantum computing, artificial intelligence, internet platforms, and the bleeding of these industries into new markets (Thomson Reuters, 2018).

Summary

Companies consistently look for new opportunities to remain competitive (Galvango & Dalli, 2014), even when those products they envision are not entirely within their reach (Gassman et al., 2010). In such cases, open innovation offers a quicker, cheaper path to market than other options such as mergers and acquisitions, outsourcing,

or hiring (Chesbrough & Bogers, 2017; Prandelli et al., 2006; Sawhney et al., 2005; von Stamm, 2004). Open innovation also enables organizations to leverage their core competencies while strategically aligning with partners to deliver better, stronger products faster than they otherwise could (Ponstiskoski & Asakawa, 2009).

However, open innovation introduces substantial challenges concerning selecting and vetting partners, protecting intellectual property, sustaining strategic relationships, building capabilities, and maintaining momentum (West & Gallagher, 2006). Moreover, roadmaps and frameworks for successful open innovation are lacking (Chesbrough & Bogers, 2017; West, 2006). This study helped fill that gap by defining a high-level framework for planning and executing open innovation within the high tech industry. The next chapter describes the methods used to do so.

Chapter 3

Methods

The purpose of this study was to define a high-level framework for planning and executing open innovation within the high tech industry. Three research questions were examined:

1. What are the steps in the open innovation process?

2. What challenges threaten the success of open innovation projects?

3. What best practices may be applied to the process to promote successful outcomes?

This chapter describes the methods used in this study. First, the research design is described, followed by a description of the procedures to recruit participants, ethical considerations, and procedures for data collection and analysis.

Research Design

This study used a qualitative research design. This approach enabled the development of a rich, contextual understanding (Creswell & Creswell, 2018) of how open innovation works from a diverse sample of experienced professionals.

As a qualitative study, this research was inherently distinct from a quantitative study, which often aims to seek to confirm hypothesis about phenomena. In contrast, this approach sought to gain a deeper understanding of the open innovation model, eliciting the experiences of professionals within the high tech industry to gain a more specific approach, thus, gaining more specific results (Creswell & Creswell, 2018).

The benefits of qualitative research design include a deeper understanding of phenomena; the ability to explore personal experiences (Punch, 2011); the ability to

understand social interactions; the ability to seek out specific findings; and the ability to explore, discover, and construct new findings utilizing in-depth interviews (Kvale, 1996).

The drawbacks of qualitative research have much to do with the ways in which data is elicited from research subjects. Generally, qualitative research does not provide the opportunity to describe characteristics of a large population, it does not use the same highly structured methods such as surveys and questionnaires. Moreover, since the design of qualitative research is more open-ended than quantitative research, it provides fewer opportunities for strict research design, more specifically, how inquiry is carried out to elicit large data sets (Punch, 2011).

A qualitative approach was appropriate for this study because the topic of open innovation is relatively new (Chesbrough & Bogers 2017). Moreover, qualitative research has been proven to elicit in-depth, rich, contextual data (Creswell & Creswell, 2018), which was needed to achieve the outlined aims of this study.

Participants

Kvale (1996) advised that qualitative studies recruit samples ranging from 5 to 25 participants based on the nature and complexity of the topic. This study relied upon a sample size of nine individuals to allow for the generation of diverse, high quality data. Thus, the resulting findings served as exploratory data to inform continued research beyond this thesis.

The selection criteria aimed to assure that participants had the breadth, depth, and quality of experience to offer valuable study data. Participants needed to satisfy four criteria:

1. Participant has at least 3 years of full-time professional work experience in the high tech industry. This criterion helped assure that the participant had adequate understanding of the industry and how firms operate within it.

2. Participant is an employee of a high tech organization that employs at least 10 full-time workers. This criterion was established because these types of organizations must manage both internal and external dynamics surrounding the open innovation initiative that affect the ultimate project success. Moreover, selecting employees from smaller organizations would reduce the amount of complexity involved in the process, thus limiting the scope and validity of the data.

3. Participant holds a first-level manager position or higher in the organization. Participant needed to be involved in the decision-making process so that they understand the potential complexities and considerations involved in the process.

4. Participant has more than 1 year of experience collaborating with a firm outside their organization to innovate one or more new products. This criterion helped assure the participant had real-world experience with the process, benefits, and challenges of open innovation.

Both convenience and snowball sampling were used in this study. Convenience sampling was a valuable approach for drawing a nonrandom target population of individuals who meet a specific set of criteria. In convenience sampling, the goal is to identify individuals that meet the criteria of the research, while simultaneously meeting certain practical criteria: ease of accessibility, geographical proximity, availability, and willingness to participate in the study (Etikan, Musa, & Alkassim, 2016).

The most common disadvantage to convenience sampling is that it can be biased, meaning the participants may not be representative of the larger population being studied. The reliance on researcher judgment during participant selection further increases the chances of sampling bias (Etikan et al., 2016).

Snowball sampling, also known as chain referral sampling, involves asking others to refer candidates who may fit the selection criteria. A noted disadvantage to this style of sampling is that finding respondents and creating referral chains can be difficult, verifying the eligibility of respondents can be a challenge, and controlling the types of

chains and number of cases in any chain can lead to an inconsistent mix of results (Biernacki & Waldorf, 1981).

Participants were recruited using two primary approaches. First, a list of the researcher's personal contacts in the high tech industry who may be interested in participating or who may know people interested in participating was created. These individuals were contacted (see Appendix B) to tell them about the study and invite them to participate.

Second, participants were recruited through high tech conferences and networking events. The first step was to identify several events that draw high tech firms. Attending firms were contacted by email and a conversation during the conference was requested (see Appendix A).

During initial conversations with prospective participants, candidates were briefed about the study and its merits and their eligibility for the study was confirmed. An interview time was scheduled with each qualifying candidate who was willing to voluntarily participate. Participants received a consent form (see Appendix B) by email 1 week before the interview. Recruitment was completed once nine interviews were completed.

Ethical Considerations

This study was conducted under the supervision of the Pepperdine University Institutional Review Board. All human participant protections were observed. Confidentiality and consent procedures were used to protect the participants from risks to their mental, emotional, or physical health. In particular, each participant was provided with a consent form (see Appendix C). The researcher reviewed this form with the participant, answered any questions they had, and required a signed copy from the

participant 1 week before proceeding with an interview. All data collected were de-identified to protect participant confidentiality. Study data were stored in a password-protected file on the researcher's external hard drive. Hard copies of the data produced during the intervention have been stored in a locked cabinet accessible only to the researcher. After 3 years, hard copies and digital drives will be destroyed using a shredder.

Data Collection

An original nine-question interview script (see Appendix D) was used to gather qualitative data from each participant. Before conducting the voluntary interview, signed consent forms were collected and any questions or concerns voiced by the participant were addressed. The script was organized into four sections:

1. Demographics: Participants were asked for information regarding their professional background, experience within their organization, and experience within the industry. Each participant's gender also was noted.

2. Thoughts about open innovation: four questions were asked to solicit participants' experience with open innovation and the factors that contribute to its successful implementation. To establish rapport, participants were asked about their experience regarding innovation and what stands out for them most. Next, they were asked to talk about the nature of their experience with open innovation.

3. Closing question: A final closing question solicited any additional opinions on the study topic.

Each interview was conducted by phone, via video chat, or in-person. The participant also had the option of selecting a private location for the interviews where the conversation would not be overheard or interrupted. Data were audio-recorded and transcribed for later analysis.

Data Analysis

The data regarding demographics was used to design a unique profile for each participant represented by the sample. The remaining interview data was examined using content analysis as described by Elo and Kygnäs (2008). The following steps were taken:

1. Interview notes were read to gain an understanding regarding the breadth and depth of the information gathered.
2. Each response was reviewed question by question to code meaning units. The following codes were used to initially classify the data: innovation, collaboration, co-creation, open innovation, working with outside firms, value, challenges, suitability, tools, tactics, and rewards. New codes were later developed after the interview process to further codify the results.
3. Data were reorganized based on codes that emerge.
4. When the analysis was complete, the number of participants reporting each code was calculated and analyzed.
5. Results were audited by a second coder who determined the validity of the analysis. Any discrepancies were later revised to yield a higher quality of results.

Summary

This study aimed to identify a high-level framework for implementing open innovation in the high tech industry. A convenience sample of nine managers with at least 3 years high tech industry experience and at least 1 year open innovation experience were interviewed about their perspectives, experiences, and approaches related to open innovation. The data was content analyzed to gain a better understanding of the values, challenges, rewards, and outcomes of open innovation.

Chapter 4

Results

The purpose of this study was to define a high-level framework for planning and executing open innovation within the high tech industry. Three research questions were examined:

1. What are the steps in the open innovation process?

2. What challenges threaten the success of open innovation projects?

3. What best practices may be applied to the process to promote successful outcomes?

This chapter reports the results of the study. Nine open innovation professionals were interviewed for this study. Profiles of the participants interviewed are presented first, followed by a reporting of the thematic findings organized by research question.

Participant Profiles

Participant 1 is a male in his late 60s. He holds a Ph.D. in chemistry. He is a senior manager of open innovation and connected development at a multinational consumer products manufacturer headquartered in the Midwest. Participant 1 draws from more than 25 years of experience in the R&D of new products and has a breadth of international experience.

Participant 2 is male in his late 40s who holds a master of business administration from an American Ivy League institution. He has more than 7 years of experience in corporate strategy and innovation in one of America's top pharmaceutical companies. He currently works in the high tech industry to support the development of start-ups. Participant 2 draws from his experience working with open innovation to solve complex problems in both the field of high tech.

Participant 3 is in his early 40s and holds a Ph.D. in biology from an American Ivy League institution. He is a senior manager at a multinational high tech conglomerate and has more than 3 years of experience specific to open innovation and a decade of experience as a senior scientist. Participant 3 draws from a breadth of international experience managing innovation between universities, multinationals, individuals, and start-ups.

Participant 4 began his career in information technology and is now in the C-suite at a start-up based out of Silicon Valley. He is in his mid-30s and has been in the field of high tech for his entire career. Participant 4 draws from the experience of his start-up's utilization of open innovation to streamline the development of his company's products and services.

Participant 5 is a male in his late 40s and holds a bachelor's degree in mechanical engineering. He works as an open innovation manager at a multinational consumer products manufacturer. Participant 5 draws from over 20 years of experience in R&D and has extensive experience in the high tech industry.

Participant 6 is a male is in his late 60s who holds a Ph.D. in organizational behavior and is based on the west coast. He is the author of several articles published in the *Harvard Business Review* and is the Chairman of a renowned consulting firm. He is a member of a high profile American investment firm. Participant 6 draws from years of experience in tech manufacturing, as well as the utilization of open innovation to accelerate the development of start-ups he invests in.

Participant 7 is a male in his late 60s based out of the northeastern part of the United States. He holds a master's business of administration and master of science in electronics and engineering. Before becoming the managing partner at a renowned

innovation institute, Participant 7 has held positions as the vice president of open innovation at one of the world largest high tech firms, as well as a position as the executive director of an organization aimed at delivering network energy efficiency.

Participant 8 is a male in his late 60s, based out of the northeastern part of the United States. Participant 8 has made a career for himself in the field of innovation, becoming the president of a firm who represents innovators across the country. Participant 8 draws from over 40 years of experience in the field of open innovation, ranging from household products to high tech products.

Participant 9 is a male in his late 30s who holds a bachelor of arts, master of philosophy, and master of business administration from Ivy League U.S. institutions. He has more than 5 years of experience in management consulting, and 3 years of experience in open innovation and sustainability. Participant 9 draws from his experience at one of America's top innovation consultancies, specializing in the field of sustainable innovation practices.

Steps in the Open Innovation Process

The interview began by asking participants to briefly share their initial ideas about open innovation. Analysis of their responses indicated three general ideas (see Table 1). Although two participants pointed out that open innovation has always existed, albeit under different terms, three participants emphasized that it is a current trend occurring across industries. Participant 2 explained:

> I think it's a movement that's going to continue, and if anything, it's going to get more expansive and more organized. It's not such a mystery anymore. It's becoming clearer. The different channels that you can play in; whether it's corporate, start-ups, a mix of those, or somebody who helps you build something.

Three participants additionally pointed out that competitive pressure is driving the need for open innovation. Participant 2 added:

> This whole wave of technology where so many companies are seeing themselves as disrupted either within their own industry or from other industries has really made companies have to be a lot more open to working with the outside.

Table 1

General Reflections on Open Innovation

Reflection	n
Current trend occurring across industries	3
Competitive pressure is driving the need for open innovation	3
Open innovation has always existed	2
No response	1

N = 9

To gain a better understanding of what, if any, roadmaps exist in the open innovation space, the interviews continued by asking the interviewees if they had seen or used any step by step guides to successfully execute open innovation. Eight of the nine interviewees mentioned that there were no clear roadmaps that they use for open innovation, due to the uncertainty and inherent complexity of open innovation. Moreover, one participant mentioned there were dated texts regarding the paradigm, and one other mentioned that there were five explicit steps that people have used to execute open innovation (see Table 2). Regarding the theme that no clear roadmaps were most consistent, Participant 8 explained, “I think that’s going to be different for every company. I wouldn’t say that everybody uses a very well-structured innovation process.” Participant 4 added, “The people who know what they’re looking for, I imagine there might be some roadmap out there, but at our level, you don’t even know what you’re looking for.”

Table 2

Roadmaps for Open Innovation

Theme	n
No playbooks due to the uncertainty and inherent complexity of open innovation	8
Must always evolve the process	3
Playbook available in some seminal papers	1
Five steps characterize the general process	1

$N = 9$

Furthermore, three participants added that for open innovation to be successful, as Participant 9 adds "Our process evolves based on the successes and failures over time." Participant 7 stated, "You have to try. There is no real recipe." While Participant 2's statement was a statistical outlier, it is important to note that he had five clear steps for approaching open innovation, the steps are summarized as follows:

Step 1: Identify from the problem from a business and consumer standpoint

Step 2: Identify internal solutions, start-up solutions, corporate solutions, then put them in the top of your pipeline

Step 3: Develop a tentative solution

Step 4: Test the solution

Step 5: Deliver the solution

Participant 2 further added "that framework is becoming more commonly used"; however, he did note that he "wouldn't say that everybody uses a very well-structured innovation process."

When asking about roadmaps for effective open innovation, a number of models were presented that helped identify different tools that can be used to successfully engage in the practice. The most common theme was the method of outsourcing a specific piece of the product lifecycle, with four participants adding value to the subject (see Table 3).

Moreover, acquiring smaller companies; participating in deliberate, in-depth, ongoing co-creation; and hosting open innovation competitions were each mentioned by two interviewees per theme. Participant 6 explained, “In Silicon Valley, it’s rare to find a company who makes their own products.” Participant 1 added, “There are also companies that don’t need a full-scale open innovation program [so] you can work with consultants who can help you do a one-off program.”

Regarding open innovation as an acquisition strategy, Participant 5 said, “Amazon’s way to approach open innovation is to partner with external organizations, and, if they see potential, they acquire.” In relation to deliberate, in-depth, ongoing co-creation, Participant 6 added, “When approaching open innovation, there is a deliberateness and a greater focus on co-creation as opposed to delivering finished parts.”

Regarding open innovation competitions, Participant 5 explained, “Our company has different programs where students compete and participate in different quality design challenges or studies.” He added that partnering with universities across the United States can be a tactful approach for opening up the innovation of their firm.

Table 3

Models of Open Innovation

Model	n
Outsource specific steps of product lifecycle	4
Acquiring smaller companies	2
Engaging in deliberate, in-depth, ongoing co-creation	2
Hosting open innovation competitions	2
Building innovations around existing platforms	1

$N = 9$

Challenges of Open Innovation

When asked about the challenges that arise during open innovation, four participants each cited (a) the complexities of partner characteristics being misaligned and (b) the handling and monetization of data (see Table 4). Three participants cited the difficulties of being unable to predict the success of each innovation. Two participants mentioned trouble with employee engagement.

Table 4

Challenges of Open Innovation

Challenge	n
Partner characteristics (size, capabilities, growth, agendas, conflicting dynamics) can undermine projects	4
Handling and monetizing accompanying data	4
Difficulty predicting success of each innovation	3
Employees feeling threatened when engaging external partners	2
Limited understanding of open innovation, limited access to innovators and inventors	2
Poor execution of various stages of open innovation	2

$N = 9$

On the topic of partnership alignment, Participant 5 explained that if a small company develops a technology that could be useful for a company as large as Nike, they need to be ready to deliver that product at scale. He adds that if a company has an innovation that a larger firm needs, and they say "ok, we need 30 million of those in 5 months," the organization likely has a problem on their hands.

The next theme concerned open innovation and the complexities that arise when data is an asset of either organization. "The dilemma for open innovation in Silicon Valley is who owns the IT, and who owns or has access to the data? You can't see a new start-up these days without the conversation" says Participant 6. Participant 2 described the complexities when data is a key asset of an organization, particularly small firms:

> [Regarding sensitive data,] you have to be really careful because that's going to tell you if the product works or not, so you can't really be sharing it openly until you figure out what's going on with the product, so you have to have an ability to have enough data to illustrate an outcome.

Best Practices to Promote Successful Outcomes

To elicit best in class practices for implementing successful open innovation, the study asked each interviewee about the commonalities between their most successful open innovation initiatives. Two themes were each mentioned by four participants. One theme was that business units must be able to clearly explain why the open innovation is happening in the first place. The second theme was that firms must be able to explore, fund, and market test a wide variety of partnerships and solutions. It was also mentioned by three individuals that it is important to designate a neutral convener or facilitator to lead the project, as well as three other individuals that expressed a need to secure formal legal protection for products, services, and ideas (Table 5).

Table 5

Success Factors for Open Innovation

Success Factor	n
Be able to clearly explain why open innovation is necessary	4
Explore, fund, and market test many partnerships and solutions	4
Designate a neutral convener and facilitator to lead project	3
Assure alignment with organizational strategy and implement appropriate organizational structures	3
Secure formal legal protection for products, services, and ideas	3
Freely discuss innovation ideas to advance thinking and identify opportunities	2
Leverage available technology to manage open innovation process	1

$N = 9$

Participant 4 explains why providing clarity regarding the open innovation initiative is so important:

> Don't just do open innovation because everybody does open innovation. That doesn't make sense at all. If you can do it yourself, do it yourself. It's much easier

> that way. But in case your strategy wants you to focus on something and you cannot do all of, or even a part of it, you have to go outside. If you are going to go this route, you have to be able to explain why you are doing this. It should be clear to everybody. If you don't explain the "why," [your stakeholders and employees] will question you.

As for testing, exploring, and funding a wide range of opportunities, Participant 3 commented about his company's strategy:

> I'm on a team of people that is always going to events. University tech showcases or start-up demo days or events at different incubators or accelerators. Any place where people are talking about new technology and they are looking for external partners. Sometimes these universities or start-ups are looking for corporate partners and sometimes they're not that excited about working with us. We have to find the opportunities where there's a fit on both sides and see where we can get work.

Participant 9 added, "Work with who has the greatest technology, work with a lot of partners, don't get too siloed, try to avoid "not-invented-here syndrome [and you will be able to get great ideas]."

Participant 9 additionally stated about designating a neutral convener and facilitator to lead open innovation initiatives:

> There are also companies that don't need a full-scale open innovation program that can work with consultants who can help facilitate one-off programs, if you want to do a competition or a challenge based around a technology you care about, and just see what proposals come in. That's also a great way to do it with a lot less overhead and investment.

When asked about the commonalities between each of the interviewees' most successful open initiatives, there were also best practices for the implementation of open innovation that emerged. The most common theme, mentioned by five participants, was that vetting partnerships to make sure they are mutually beneficial, and discontinuing them when appropriate, was imperative. Moreover, it was explained that each party should be able to clearly articulate their roles, responsibilities, and desired outcomes (Table 6).

On vetting partnerships, assuring they are mutually beneficial, while discontinuing those that are not, Participant 5 said, “A lot of times people are polite. People shy away a lot of times from saying that it’s not a good fit. They try to force the relationship. This is true from both sides.” Participant 1 added, “We really have to understand what they want out of this if we do some kind of collaboration or a deal, and then try to structure things so both parties get what they want.”

Regarding the clear articulation of each party’s roles, responsibilities, and desired outcomes, Participant 4 said, “Figuring out where his job ends and our job begins is the first step. We sorted that out, and now he’s treating us as his likely first customer.” Further supporting this theme, Participant 8 explained:

> There has to be a financial but also an intellectual framework around the partnership, to be clear that what happens when you create something new. From the onset. Before you begin. Because if you have to start a discussion when you’ve invented something, later to have the discussion is about who owns it, that’s very painful.

Table 6

Partnering Best Practices

Best Practice	n
Vet partnerships and assure they are mutually beneficial; discontinue partnerships as appropriate	5
Clearly articulate each parties’ roles, responsibilities, and desired outcomes	4
Different open innovation projects require different types of partners	3

N = 9

Also elicited regarding best practices in the field of open innovation, were the common outcomes that happen in the field. The most common, which was mentioned by six of the eight participants, was the ability to efficiently access external knowledge and expertise. Also noted by three participants was that open innovation provided a unique opportunity to test new products, concepts, ideas, and brands. Another key outcome,

represented by three individuals, was the ability to use the open innovation platform to build networks and expand their recruitment pipeline (Table 7).

Regarding the ability to efficiently access external knowledge and expertise, Participant 2 asserted that the need for open innovation comes from "the realization that obviously not all the smartest people work in your company." Participant 9 added, regarding a conference he recently attended:

> I went to a conference yesterday that was maybe 200 biotech investors and they brought in about 20 early stage projects from universities. Some of them had already formed a start-up, some of them hadn't. The whole theme of the full-day conference was that companies can't do everything on their own and you can often save a lot of time and money by working with external partners.

Additionally, on the topic of creating and testing new products, concepts, ideas, and brands, Participant 1 had this to say:

> Open innovation gives you a nice way of kick starting things and getting fresh thinking and people who aren't bound up by the bureaucracy and the history. They bring in fresh ideas. Beginners' eyes or novices' eyes. It can really help break things loose.

Table 7

Outcomes of Open Innovation

Outcome	n
Efficiently access external knowledge and expertise	6
Expedite progress	3
Create and test new products, concepts, ideas, brands	3
Building network and recruitment pipeline	3
Corporate social responsibility	2
Enhanced perception of company success or value	1

N = 9

Summary

In summation, nine experts in the field of open innovation were interviewed. Valuable insights were discovered regarding roadmaps for open innovation, models of

open innovation, challenges of open innovation, success factors for open innovation, partnering best practices, and outcomes of open innovation.

Chapter 5

Discussion

The purpose of this study was to define a high-level framework for planning and executing open innovation within the high tech industry. Three research questions were examined:

1. What are the steps in the open innovation process?

2. What challenges threaten the success of open innovation projects?

3. What best practices may be applied to the process to promote successful outcomes?

This chapter provides a discussion of the study results. A summary of key findings is presented first, followed by study conclusions. Recommendations for open innovation professionals, companies, and OD practitioners are then provided. Limitations are acknowledged and suggestions for research are outlined.

Key Findings

Steps in open innovation. The key findings indicated a considerable lack of open innovation roadmaps or playbooks in use. Based on participant reports and past literature (Ponstiskoski & Asakawa, 2009), roadmaps have been difficult to define due to the uncertainty and inherent complexity of open innovation; however, growth in this practice underscore the importance of creating and continually refining such models. Participants additionally stressed the importance of identifying why open innovation is necessary for strategic alignment to be achieved, consistent with Roser et al. (2013). One participant outlined five explicit steps to open innovation. This represents a potential contribution to literature, although the steps need to be confirmed and further elaborated through continued research. Participants additionally noted that partner characteristics play a large

role in the success of open innovation initiatives, consistent with past studies that stressed the importance of trust and commitment (Hingley, 2005; Morgan & Hunt, 1994).

These findings suggest that while the outcomes of open innovation have been highly researched, contextual roadmaps to reach these goals are considerably lacking or rarely used. If organizations were to identify concrete steps for the open innovation design for their respective field, there could be a clearer roadmap as to how to successfully implement open innovation design. Moreover, the qualitative research indicates that the process for implementing open innovation needs to evolve based on a data set of successes and failures over time. If one is to develop a roadmap for open innovation in a particular industry, it must have malleability built into it. Moreover, since the study data emphasized the importance of strategic alignment among partners, commonality is considered imperative to successful open innovation design.

Challenges of open innovation. The study also found considerable challenges to approaching open innovation, including the concept that partner characteristics (size, capabilities, growth, agendas, conflicting dynamics) can undermine the success of open innovation projects. Similarly, Roser et al. (2013) outlined processes for designing and effectively managing co-creation practices. Participants also noted the difficulty of predicting the success of open innovation initiatives, as did West and Gallagher (2006). Lastly, it was noted in that for start-ups to gain more leverage in the open innovation space, they must consider how to properly handle and monetize their accompanying data while keeping sensitive information confidential.

Inconsistent with past research was the present study findings regarding the role of data in leveraging start-ups to have more impact in the open innovation space. It is

possible that this finding is due to external circumstances, due to the fact that data being such a key asset for start-ups is a relatively new concept.

In order for firms to successfully implement open innovation design, they must evaluate the characteristics of their potential partner, including size, capabilities, projected growth, and agendas. They must also be hyper-aware of any conflicting dynamics, which can play a large role in the success of the open innovation initiative. This study also suggests that unpredictability is a key facet of open innovation design, and if firms are not ready for that factor, it may be a strong indicator of whether or not their organization is ready to participate in this practice. Lastly, the study found no explicit research regarding how start-ups can leverage the value of their data to gain a larger footprint in the open innovation space. If start-ups are to consider how they can leverage their data to participate in the open innovation space, the research suggests that this could be quite useful.

Best practices. Participants noted that vetting partnerships is key for knowing which ones to continue (due to mutual benefits) and which to end. Similarly, Pérez and Cambra-Fierro (2015) emphasized the importance of finding organizational and strategic alignment and outlined what occurs when vetting partnerships.

Study findings also indicated that designating a neutral convener can help facilitate open innovation, especially in one-off contexts, as noted by Piller et al. (2012). Notably, the researchers provide no roadmap for getting there.

Additionally, it was found that it can be quite useful to secure formal legal protection for products, services, and ideas, while it is also important to explore, fund, and market test a high volume of initiatives. Chesbrough and Bogers (2017) asserted that creating formal, contractual understandings before initiating open innovation initiatives is

critical. Study findings also indicated that testing, funding, and exploring a high volume of ideas are helpful activities, as similarly expressed by Chesbrough and Bogers.

Based on these findings, three things are worth mentioning. First, vetting relationships is imperative to the success of open innovation initiatives. However, there is no clear, contextual process for vetting these relationships; accordingly, this study suggests that building such a model may be useful. Second, the research suggests that getting a formal understanding of the nature of the open innovation relationship on paper can be an important step to approaching this process. The research also suggests that acquiring a high volume of inputs for open innovation can be very beneficial to an organization, especially if the firm is large and has the bandwidth to manage that level of volume. Third, the research suggests that designating a neutral convener can be highly beneficial for organizations looking to participate in open innovation design, which can be useful for consulting firms looking to expand their portfolio and for organizations that are new to open innovation or do not have the bandwidth to manage it.

Summary of Findings

1. Due to the uncertainty and complexity inherent in open innovation, there is a considerable lack of open innovation roadmaps or playbooks in use.
2. Partner characteristics (size, capabilities, growth, agendas, conflicting dynamics) are the most common variables that can undermine the success of open innovation projects.
3. Doing diligence and vetting partnerships are key components of effective open innovation design.

Recommendations for Open Innovation

Four basic recommendations are offered:

1. Honesty. Whether intentionally or not, organizations participating in open innovation should stop pretending relationships are a good fit if they are not. This conclusion was drawn because four of eight participants explicitly stated

that organizations need to be honest about their size, capabilities, growth, and agendas if they are going to have successful open innovation initiatives.

2. Transparency. Stakeholders should be transparent about their organizations strategic initiatives and expect the same from their partners. This could be done by engaging in ongoing and engaged contact between the two parties, rather than passing things off to each other in the hopes that they turn out right.

3. Welcome high frequencies of inputs. Organizations participating in open innovation should continue to welcome high volumes of inputs for innovation, so long as they have the bandwidth. Four of eight interviewees stated that it is imperative that firms fund, test, and explore many opportunities. This could be done by setting up an online gateway for potential partners to submit their innovations that meet an explicit need as described by the organization welcoming the innovation.

4. Define the "why." When organizations participate in open innovation, they should be clear to stakeholders at all levels of their organization as to why they are bringing in ideas from the outside, and they should also be clear about why they are giving any information they have to outside organizations. Four of eight interviewees said that this was imperative to open innovation design, while the work of Roser et al. (2013) also explained the importance of this tactic. In order to accomplish this, it is recommended that at the initiation of any open innovation initiative, all key stakeholders should convene to hear an explanation from leadership as to why they are participating in this initiative.

Recommendations to companies considering open innovation. Three recommendations are offered:

1. Assess all internal assets before participating in open innovation, as this was explicitly stated by four of eight study participants. This is imperative because this study suggests that it is easier to innovate internally if firms already have the resources, and could save them a great deal of complexity. As a result, it is imperative to make sure there are no untapped resources within the firm's boundaries by addressing the goal of the innovation to the appropriate stakeholders.

2. Evaluate which knowledge gaps are in the organization so proper partnerships to facilitate open innovation can be identified. As outlined by Chesbrough and Bogers (2017) and detailed by six of eight interview participants, open innovation is a highly effective way of accessing external knowledge and expertise. At the same time, care should be taken to identify and assess the costs of alternative ways to close the gap and to determine if open innovation is appropriate for this situation.

3. Firms should also vet their partnerships to make sure that there is a "win-win" strategy built into the innovation process from the very beginning. This tactic was raised by five of eight study participants and was also outlined by Roser et al. (2013). Moreover, one way of ensuring that each company commits to a win-win outcome is through formal legal documents, as recommended by three of the eight study participants and detailed by Chesbrough and Bogers (2017).

Recommendations to organization development practitioners. Three recommendations are offered:

1. As noted by three of the eight study participants, having a neutral convener or facilitator can have significant improvements when implementing open innovation. This provides an opportunity for organizational development consultants to act as a third party that facilitates the open innovation process. This could be accomplished by expanding the role of organizational development firms into the field of open innovation. Such firms should brand their services as transorganizational innovation development, as discussed by Millar, Demaid, and Quintas (1997).

2. Roadmaps for open innovation are rarely researched or used, as mentioned by eight of the nine interviewees. Thus, there may be an opportunity for organizational development professionals to create a well-defined roadmap to execute open innovation in various fields—especially high tech. As mentioned by the study participants, each open innovation initiative is highly contextual. Therefore, organizational development professionals would need to utilize training and skills around the management of ambiguity to help facilitate innovation between firms.

3. Roles, responsibilities, and perceived outcomes need to be clearly stated for effective open innovation to occur, as explained by four of the eight interviewees. A background in organizational development could be highly beneficial for this exercise. Implementation of responsibility charts could be an effective way of managing this venture.

Limitations

Four limitations affected this study:

1. Bias. It is acknowledged that positive bias may have played a role regarding the quality of the results. Due to the large volume of data collected, any data that was found to be irrelevant had to be removed. It is possible that the study may have been affected this, as beneficial segments of data may have been filtered out. Although a second coder reviewed the analysis to avoid this limitation, future studies could additionally employ other methods (e.g., member checking) to confirm the accuracy of the results.

2. Study time frame. It is acknowledged that longitudinal restrictions may have impacted the quality of this study, as the research was conducted over a 6-month time period. To avoid this in the limitation in the future, it is recommended that any following studies require no less than 12 months to conduct the entirety of the research. Given a longer study time frame, for example, it could be possible to conduct action research or utilize case study methods to allow for observation of the open innovation process over time.

3. Small sample size. The study relied on a small sample of nine open innovation professionals. Moreover, the all-male, U.S.-based sample in their 40s or 60s was relatively homogeneous. It is possible that female participants, younger participants, or participants outside the U.S. may have different perspectives of the open innovation process.

4. Measurement. Lastly, it is acknowledged that the measure used to collect data could have been improved. Since open-ended questions were asked, it became apparent that many answers strayed away from the purpose of this study; thus, the study had to trim certain responses to elicit what was believed to be of the most importance to this study. It is recognized that this approach may have provided for a greater bias in selecting relevant data, and further study that utilizes more specific questions is recommended.

Suggestions for Future Research

For further research, it is suggested that researchers examine the importance of size, capabilities, growth, agendas, and conflicting dynamics in the facilitation of effective open innovation processes. While four of eight participants noted how important these dynamic were, there was a negligible amount of data regarding how organizations can make sure that there is alignment in any of the mentioned verticals. It is suggested that the researcher picks one of these verticals (e.g., size) to narrow the focus of the research and get highly specific results. A potential research question would be, “What role does the size of organizations play in open innovation?”

Additionally, it is suggested that future researchers take a thorough look into the open innovation practices of a multinational firm to elicit how they manage high volumes of inputs and choose the innovations that make the most sense for their company. Because the research was looking at the high tech industry as a whole, it was impossible

for the study to narrow its focus on one specific company and get into the granular details of managing open innovation.

Lastly, while four of eight participants of this study noted the importance of vetting partnerships to make sure they are the right fit, there was no indication as to how firms go about vetting these opportunities. Since this is such a critical aspect of facilitating the process of open innovation, more research is needed regarding how a company, especially one that is new to the field of open innovation, would go about doing this. A possible research question would be "How are partners efficiently vetted in the field of open innovation?"

Summary

The purpose of this study was to develop a high-level framework for planning and executing open innovation within the high tech industry. Using a mixture of snowball sampling and convenience sampling, nine managers with at least 3 years industry experience and at least 1 year open innovation experience were recruited to participate. Each participant was asked about the necessity of open innovation, any tools they have used, and where they see the future of open innovation headed.

The participants were asked about the steps of the open innovation process, what challenges may threaten the open innovation process, and best practices for promoting successful outcomes. The key findings were that there is a considerable lack of open innovation roadmaps or playbooks in use, due to the uncertainty and inherent complexity of open innovation. Partner characteristics such as size, capabilities, growth, agendas, and conflicting dynamics are the most common variables that can undermine the success of open innovation projects. Due diligence and vetting potential partnerships are keys to initiating successful open innovation design.

Study findings helped support recommendations for organizations looking to participate in open innovation to consider their internal assets before participating in open innovation, to identify their knowledge gaps to help discover the right partners, and to seek mutually beneficial relationships when vetting their potential partners. Recommendations for experienced professionals participating in open innovation are to be transparent about their firm's goals and resources, to welcome high volumes of inputs for open innovation, and to be clear with all stakeholders regarding the intentionality of opening up their innovation processes. The recommendations for organizational development professionals are to develop methods to facilitate transorganizational innovation, help organizations participating in open innovation manage ambiguity, and help organizations participating in open innovation to define clear roles and responsibilities.

For further research, it is suggested to take a deeper look into how the size of organizations effects open innovation, narrow the focus of this research to one multinational firm, and discover what best in class techniques exist for vetting partnerships when participating in open innovation. The key impression of this study is that roadmaps for open innovation are highly contextual and that organizations need to find the right steps to facilitate open innovation in their firm.s

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Appendix A: Networking Invitation for Potential Study Participation

Hello,

My name is Taylor Pile and I am conducting research for a thesis for my Master's Degree, at Pepperdine University, regarding the implementation of innovation between multiple firms, sometimes known as open innovation. More specifically, I am interested in decision makers who have a breadth of experience in this field. I've noticed your firm will be attending (insert conference) and was hoping that you would spare 10 minutes of your time to talk more about this study in person.

Please, at your earliest convenience, let me know your availability during the conference and I will do my best to find a time that works for us to talk about the field of innovation.

Thanks for your time!
Taylor Pile

Appendix B: Study Invitation

Hello,

I am conducting research to help define a high-level framework for planning and executing innovation between firms within the high tech industry. This is part of my master's in Organizational development at Pepperdine University.

I am writing to request your participation in this study. Participation will involve a 1-hour, in-person or telephone conversation with me to discuss the strategies that you use to effectively management innovation when work with firms outside of your own, in other words, "open innovation." Upon your agreement, the conversation will be scheduled at a time and location convenient for you.

To participate, you need to meet the following criteria:

1. Work at an organization in high tech (science, technology, engineering, or mathematics) that has more than 10 employees.

2. Have worked in the field of high tech for a minimum of 3 years.

3. Hold a first-level manager position or higher in the organization.

4. Have a minimum of 1 years' experience in collaborating with firms outside yours to facilitate the innovation process.

Participation is voluntary and confidential. You would not be identified in the study and any answers you provide would be pooled with others' responses and reported in aggregate.

At your earliest convenience, would you please let me know if you are willing to participate in my study?

Thanks in advance for your help!

Appendix C: Consent Form

PEPPERDINE UNIVERSITY
Graziadio School of Business and Management

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH ACTIVITIES

Developing a Framework for Open Innovation

You are invited to participate in a research study conducted by Taylor Pile, MS candidate, under the supervision of Miriam Lacey, PhD at Pepperdine University, because you fit the criteria as being a knowledgeable resource in the field of open innovation. Your participation is voluntary. You should read the information below, and ask questions about anything that you do not understand, before deciding whether to participate. Please take as much time as you need to read the consent form. IF you don't need this previous sentence I'd delete it. You will also be given a copy of this form for your records.

PURPOSE OF THE STUDY

The purpose of this study is to define a high-level framework for planning and executing open innovation within the high tech industry.

STUDY PROCEDURES

If you volunteer to participate in this study, you will be asked to take part in n interview. You will be asked questions about your work experience, experience with collaborating with firms outside of yours to develop new products, as well as your experience in the high tech industry.

POTENTIAL RISKS AND DISCOMFORTS

The potential risks are minimal; highly unlikely risks associated with participation in this study include possible emotional upset as you think about your experiences related to open innovation. To decrease the impact of these risks, you can stop participation at any time and/or refuse to answer any interview question.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

While there are no direct benefits to the study participants, there are several anticipated benefits to society, which may include guiding future research or creating services to help organizations effectively practice open innovation.

CONFIDENTIALITY

The records collected for this study will be confidential as far as permitted by law. However, if required to do so by law, it may be necessary to disclose information collected about you. Examples of the types of issues that would require me to break confidentiality are if disclosed any instances of child abuse and elder abuse. Pepperdine's University's Human Subjects Protection Program (HSPP) may also access the data

collected. The HSPP occasionally reviews and monitors research studies to protect the rights and welfare of research subjects.

The data will be stored on a password protected computer in the principal investigator's place of residence. The data will be stored for a minimum of three years. The researcher will record your answers in a password-protected document and a unique identifier (such as "Participant 1") will be assigned to your information. Any information you share that could uniquely identify you (such names, places, or events unique to you) will be given a fake name.

The data will be stored on a password-protected external hard drive in the researcher's residence for three years after the study has been completed and then destroyed.

PARTICIPATION AND WITHDRAWAL

Your participation is voluntary. Your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study.

ALTERNATIVES TO FULL PARTICIPATION

The alternative to participation in the study is not participating or only completing the items for which you feel comfortable.

INVESTIGATOR'S CONTACT INFORMATION

You understand that the investigator is willing to answer any inquiries you may have concerning the research herein described. You understand that you may contact Taylor Pile at [contact information] or Miriam Lacey at [contact information] if you have any other questions or concerns about this research.

RIGHTS OF RESEARCH PARTICIPANT – IRB CONTACT INFORMATION

If you have questions, concerns or complaints about your rights as a research participant or research in general please contact Dr. Judy Ho, Chairperson of the Graduate & Professional Schools Institutional Review Board at Pepperdine University 6100 Center Drive Suite 500 Los Angeles, CA 90045, [contact information].

Appendix D: Interview Script

I would like to thank you for volunteering your time to talk with me to day. I will be asking you a series of questions about innovation, and how you have worked with firms outside of yours to create new products within the high tech industry. More specifically, what has worked, and what has not.

Demographics

1. Where are you located?
2. What is your professional background?
3. What positions have you held in the high tech industry? What were your starting and ending dates in those roles? You may get a MOUNTAIN of info here and use up all your interview time….! Keep it high level or you'll have problems—do you really need to know all their jobs w start/end dates? Also seems a bit invasive to me unless you actually need the info. How about keeping it simple: What is your current position?
4. Gender:

Considerations for Effective Open Innovation

5. When you reflect on your experiences with innovation between your firm and another's, what are your initial reactions?

6. Do you find innovation between your firm and another's (open innovation) to be a good use of time?

7. Do you feel that there is an effective roadmap for open/collaborative innovation for you to use?

8. Please tell me about the nature of your most successful innovation design when collaborating with a firm outside of yours.
   Possible probing questions:
   What steps did you take to ensure the initiative was a success?
   Which stage of the process was most challenging?
   Which stage of the process was most rewarding?
   What tools did you use to facilitate the collaborative/open innovation process?
   When it is all said and done, what do you want to be sure to remember as you move forward with OI initiatives?

Closing

I would like to express my deepest gratitude for taking the time to share your insights with me. In the coming months, I will be reflecting on all of the information you have shared, using it to develop a high-level framework for implanting open innovation.

9. Before we close, is there anything else you would like to share on the topic of open/collaborative innovation?